

all receive detailed and careful treatment. The author has brought to bear upon his task the experience of a practical and enthusiastic angler, and the zest of a keen student. While he realises the more serious aspects of his theme, he has dealt kindly by the general reader and writes in a light-hearted, attractive, and unpedantic manner. In this way he should be instrumental in developing a wider interest in and stimulating further research into the history of one of the oldest industries, and has given us the story of progress from a humble and despised craft to a popular and respected art.

HENRY BALFOUR.

The Metallurgy of Iron and Steel.

- (1) *Engineering Steels*. By Dr. L. Aitchison. (Reconstructive Technical Series.) Pp. xxxi+348+48 plates. (London: Macdonald and Evans, 1921.) 25s. net.
- (2) *The Case-Hardening of Steel: An Illustrated Exposition of the Changes in Structure and Properties induced in Steels by Cementation and Allied Processes*. By H. Brearley. Second edition. Pp. xi+207. (London: Longmans, Green and Co., 1921.) 16s. net.
- (3) *Iron-Founding*. By B. Whiteley. (Pitman's Common Commodities and Industries.) Pp. 131. (London: Sir I. Pitman and Sons, Ltd., 1921.) 3s. net.

(1) **T**HE advance of metallurgy in recent years has placed at the disposal of the engineer a wide range of new materials, including alloy steels which so far surpass the older, plain carbon steels in strength and toughness as to constitute a new class of metals. In the face of such diversity the engineer finds difficulty in selecting the most suitable material for a given purpose, and is not in a position to judge between the products offered by manufacturers, or recommended by specialists. There are in existence many excellent memoirs and a few books on the subject, but they are written for the metallurgist, and assume a technical knowledge that lies outside the usual field of study of the engineer. It is highly desirable that the user of a metal should understand its properties as well as the maker, and Dr. Aitchison has made the attempt, largely successful, to describe the steels now available for engineering purposes, without assuming a knowledge of chemistry or metallurgy.

The title of Dr. Aitchison's book must be interpreted in a rather restricted sense. The engineer is interested in such steels as those used for ship and boiler plates, rails, and girders, but he will find little in reference to them, the work being mainly concerned with steels required by the automobile and aircraft industries. It is these steels of high tensile strength, often required

to withstand severe alternating stresses, that present the greatest difficulties of specification and testing, and it is very necessary that the information regarding them should be collected and placed clearly before the engineering user, as has been done here. There is a very brief account of methods of manufacture, sufficing to indicate the distinction between various classes of steel, and a discussion of ingot structure, so far as is required to explain the possible sources of defects in forgings.

It is probably on account of the limitation mentioned above that only piping steel is described, and the subject of blowholes is not mentioned. Steel castings are omitted entirely, although of great interest to the engineer who uses high tensile steel forgings for other parts of his machine. The desire to avoid chemical and metallurgical difficulties leads to a somewhat excessive simplification of the chapter on heat treatment, and the author's account of hardening and his explanation of the critical points is rather misleading, although not likely to cause misunderstanding of the practical instructions. It should be said that the style is easy and readable throughout.

The subject of mechanical testing is well treated, proper attention being given to the determination of the fatigue range and its relation to the other measurements usually made in the testing laboratory. Much of the experimental material in this chapter is taken from the author's reports to the Aeronautical Research Committee. His conclusions may not always be accepted, but the importance of the subject is rightly emphasised, and the descriptions of fatigue tests and the short accounts of other special methods of testing are valuable. There are very few references to original sources, but a full bibliography of papers relating to the determination of hardness is given.

The alloy steels are considered in detail, the properties of each steel, as modified by different heat treatments, being shown by means of diagrams similar to those published by the Automobile Steel Research Committee; these diagrams provide a useful guide to the characteristics of the various classes of steels. Case-hardening and cold-working are other subjects dealt with.

The book is very well printed and illustrated, many of the best plates being selected from Mr. Brearley's works, while others show special types of testing machines. The whole subject of the relative value of tests for steels of this class is in a state of flux, and an authoritative statement is not yet to be expected, but Dr. Aitchison has made a good beginning, and his efforts will be welcomed by engineers.

(2) The first edition of Mr. Brearley's book on case-hardening was published in 1914, and it is an indication

of its trustworthy character that scarcely any statement contained in it has had to be withdrawn in the preparation of the new edition. The subject-matter has been widened by the inclusion of further particulars concerning alloy steels of the class frequently employed in automobile construction, and by the addition of sections on specifications, in regard to which the author expresses decided opinions, based on a wide experience. The treatise is of more general interest to the metallurgist than might be assumed from its title, since the description of the materials and processes of case-hardening and of the defects that may occur in case-hardened objects, involves the discussion of many other points of importance in the treatment and use of steel. On all these subjects, the advice given is sound and admirably clear in its expression. Only two minor points have been noted for criticism. There is no mention of nichrome carburising boxes, although these are now frequently used, and justify by their long life the increased cost. Plating with copper, as a means of local protection against carburisation, is still spoken of as unsatisfactory, although it has been practised with great success in the construction of aero-engine parts.

(3) The third work on our list is an elementary handbook on iron-founding. It contains a simple description of foundry methods, and the illustrations include a series of photographs of the mould for a gas-engine cylinder at various stages. Moulding is considered much more fully than melting, and the book is well adapted to give a general idea of the processes used in preparing moulds, and of the organisation of a foundry. The theoretical side is weak, and some very erroneous statements as to fuel and thermochemistry would have been better omitted. The printing and illustrations are good.

C. H. DESCH.

The Snakes of Ceylon.

Ophidia Toprobanica, or The Snakes of Ceylon. By Col. Frank Wall. Pp. xxii+581+1 map. (Colombo: Colombo Museum, 1921.)

A GOOD deal has been written on the subject of the snakes of Ceylon. Thus Günther's "Reptiles of British India" (1864), and Boulenger's "Fauna of British India—Reptiles and Batrachians" (1890), both include descriptions, and in the case of the former work, remarks on the habits of many of the snakes inhabiting Ceylon. There is also the "Snakes of Ceylon" by Abercromby, a small popular treatise which appeared in 1910. Except for the last-named work, which is very incomplete, there is, however, no book which deals solely with the snakes of Ceylon,

apart from those inhabiting India, and Col. Wall, an enthusiastic naturalist and specialist on Indian snakes, in producing the volume under review has succeeded in filling a long-felt want.

The author in his work gives an account of the marine snakes which may be met with around the shores, as well as the terrestrial forms. A full description is given of every snake, and the determination of the genera and species is often facilitated by useful, if somewhat unscientific, keys. Except when dealing with the sea-snakes, Col. Wall has in most cases adopted the nomenclature used in Boulenger's Catalogue of the British Museum. Sometimes the generic and specific names have been altered. It is impossible without going thoroughly into the various contested points to say whether the author is in every case justified in departing from Boulenger's classification, although he occasionally appears to have good reasons for so doing. We are not, however, always inspired with confidence in Col. Wall's judgment. Thus "until I am satisfied of their specific unity I prefer to regard them as distinct species" is the dogmatic reason he gives when advocating specific distinction for certain forms of Kraits, held by Boulenger, in spite of their distinctive coloration, to be only geographical varieties of the same species.

A feature of the book is the very full account given of the habits of the snakes. The author has had practical experience of the reptiles in their native haunts, and his descriptions of their feeding and breeding habits add greatly to the value of the work. There are also some interesting remarks on the subject of distribution. Many snakes inhabiting upland regions have a very restricted habitat, neither ascending nor descending beyond certain limits. The elevated ranges and peaks, where the lower slopes merge into the low country, are just as effectually isolated as if they were surrounded by the sea.

Much space is devoted to the subject of snake-bite, for the benefit of the medical practitioner, and a number of illustrative cases from the records of various doctors are given.

E. G. B.

Japanese Social and Economic Life.

The Foundations of Japan: Notes made during Journeys of 6000 Miles in the Rural Districts as a Basis for a Sounder Knowledge of the Japanese People. By J. W. Robertson Scott. Pp. xxv+446+plates. (London: J. Murray, 1922.) 24s. net.

THIS is an eminently readable book, giving not only the familiar glimpses into superficial Japanese life, but also treating of the economic life of